

Memorandum

Michael Lindgren
Division Head

Accelerator Division
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Date: November 4, 2019
To: Todd Sullivan
From: Mike Lindgren 
Re: Approval for Running NuMI

Safety documentation and procedures for restart of NuMI are now complete and in place. Therefore, you are hereby authorized to run beam to NuMI.

cc: N. Chelidze
M. Convery
P. Czarapata
T. Kobilarcik
E. McHugh
M. Schoell

SYSTEM START-UP SIGN-OFF

The signatures below, unless noted in the comments section, indicate that the relevant systems are ready for the restart of beam operation. Indicate in the comments section any remaining work that would affect the restart of beam operations. Indicate N/A for departments that did not do any work on the system.

SYSTEM BEING SIGNED OFF: Linac NIF MTA Booster [8-GeV Line-MI-10 Region]
(Circle as Applicable) [MI-20-MI-62/Recycler] BNB (NuMI) P1-P2 Muon P3-Switchyard
Meson Primary MT MC NM FAST PIP-II

DEPARTMENT	DATE	SIGNATURE (Department Head/Designee)
1. Controls	10/28/19	Jarrod Petrus
2. Cryogenics		
3. E/E Support	10/23/19	Don +
4. RPO Manager	11/4/19	Madey Scholl
5. LSO		
6. External Beamlines	11/4/2019	Philip J. ...
7. Instrumentation	10/28/2019	...
8. Interlocks	11/4/19	Russ M. Zeffo
9. Main Injector	10/23/19	Dan ...
10. Mechanical Support	10/23/2019	M Wong-Squires *
11. Muon		
12. Operations	11/04/19	Todd Miller
13. Proton Source		
14. RF		
15. ENG Support	11-4-19	Paul C Gonzalez
16. Target Systems	11-1-19	Nate ...
17. Shutdown Coordinator	11/4/19	...

mjm NA
NA
mjm NA
NA
mjm NA
NA
mjm NA

Comments and special conditions (please mark comment with department # to connect comment with appropriate department):
 * After Horn scans, target & shielding to be returned to final configuration. MC
 * MSD APPROVAL PENDING VERIFICATION OF ACNET PARAMETERS - Goal mjm 11/4/19
 + V118 needs to be recommissioned for 1.2s ramp - Done mjm 11/4/19
 + NuMI Horn AS has issues with tripping off - Fixed mjm 11/4/19

The NuMI radiation shielding meets the requirements documented in the 2018 "Addendum to the NuMI Beam Line Shielding Assessment for 1 MW Operation of NOVA Experiment" shielding assessment.

FINAL APPROVALS
 System Department Head James ... Date 11/4/2019
 Assigned RSO N. Chelidze Date 11/4/19
 AD Division Head ... Date 11/4/2019

BEAM PERMIT
11/04/2019

NuMI Accelerator Safety Envelope (ASE) Limit

The maximum beam intensity transmitted through the NuMI Beamline is limited to:
 7.45×10^{17} protons/hr up to 120 GeV.

No accelerator or beam line will transmit beam without an operational beam interlock safety system.

NuMI Beamline Operating Limits

The maximum beam intensity transmitted through the NuMI Beamline is limited to:
 2.25×10^{17} protons/hr up to 120 GeV.

Examples: Charge/hr = number of pulses/hr x number of protons/pulse

#1 1,925 pulses per hour at 1.17×10^{14} protons per pulse = 2.25×10^{17} protons per hour.

Special conditions and comments:

Reviewed by Todd Sullivan 11/04/19
Operations Department Head

Reviewed by Tom - 7226418 11/4/2019
Systems Department Head

Reviewed by N. Chelidge 11/4/19
Assigned RSO

Reviewed by Madelyn Scholl 11/4/2019
ESH&Q Radiation Physics Operations Department Head

Approved by Walt Long 11/4/2019
Accelerator Division Head

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other

November 4, 2019

Nino Chelidze

Area RSO

Mode of Operation HEP Operation

Beam Limits	Beam Energy 120 GeV	ASE Limit 7.45 E17 protons/hr	Operating Limit 2.25 E17 protons/hr
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Critical Devices I:LAM60, I:LAM61 & E:HV101A, E:HV101B

Enclosures Protected NuMI MI-65, NuMI Decay Pipe Passageway and NuMI MINOS Alcoves & Absorber Areas

Preferred Monitoring Devices* Intensity is monitored via E:TOR101

*Other methods of monitoring intensity may be used.

Requirements

Access Devices I:LAM60, I:LAM61 & E:HV101A, E:HV101B must be disabled in order to access the Carrier Tunnel, Pre-Target, Target Hall, Decay Pipe Region, Hadron Absorber & Muon Alcoves.

Cool Off Period The following air monitors must be ≤ 400 cpm prior to accessing the following areas unless waived by the RSO or designee. PreTarget: EAV1 (G:RD1225), Target Hall: NuMI TH Air Mon ACCESS (G:RD1230). NuMI Decay Pipe: EAV2 TH Air Mon (G:RD1228) & EAV3 ABS Air Mon (G:RD1229). NuMI Absorber Hall: NuMI ABS Air Mon (G:RD1242).

Special Interlocks The CDC Inputs including failure mode devices may all be found on the Safety System Status pages. The 200 module Beam Permit System inputs are summed on page E39, the detailed inputs are on E40. All Target, Horns and Absorber RAW Beam Permit System inputs are required, masking or disabling requires approval from the machine Department and RSO or designee notification.

Special Concerns Any work performed on critical devices or obtaining a critical device key requires prior RSO approval. If beam is disabled due to a genuine RAW system trip, prior RSO or designee approval is required before re-enabling beam. The dehumidifier system must be operating when beam enabled unless waived by the RSO or designee.

Gates, Fencing and Passive Shielding Requirements There is no access to radiologically fenced areas without prior RSO approval. The shield wall between the MI-65 shaft area and Enclosure is required during operation. The associated roll-up door is locked with a RSO padlock. The concrete cover blocks across the top of the targeting and horn system are required and are also locked.

Shielding, fencing and postings are in accordance with the 2018 "Addendum to the NuMI Beam Line Shielding Assessment for 1MW operation of NOvA Experiment".

Assigned RSO approval also signifies that all necessary Interlock Tests have been completed and Removable Shielding is installed.

Ops. Dept. Head Approval Todd Llin **Assigned RSO Approval** N. Chelidze

Sys. Dept. Head Approval Nino Chelidze **AD Head Approval** [Signature]

November 4, 2019

Area RSO

Nino Chelidze

Operational Comments

MCR must be appropriately staffed according to the Accelerator Safety Envelope.

Access to the MI-65 and the MINOS lower levels is acceptable. Access to MINOS ramp electronics racks upstream of Radiation Area ropes and downstream of Absorber Hall requires prior RSO approval. The Mechanical Room double doors are locked with a Radiation Safety key, and access requires RSO or designee approval.

Three Exhaust Stacks are monitored via ACNET on page D106 AIRMONs. pg. 2 as EAV1 (G:RD1225), EAV2 (G:RD1228), and EAV3 (G:RD1229). The air supply AHU-MI-65-4 runs at 1,000 cfm. The exhaust fan EAV2 runs at roughly 900 cfm. The exhaust fan EAV3 runs at about 750 cfm.

The SR3 fan/vent located in NuMI Target Hall needs to be turned off and the damper closed during NuMI beam operations. The damper is locked off with the M13 lock and requires RSO or designee approval to be opened.

November 4, 2019

Area RSO

Nino Chelidze

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

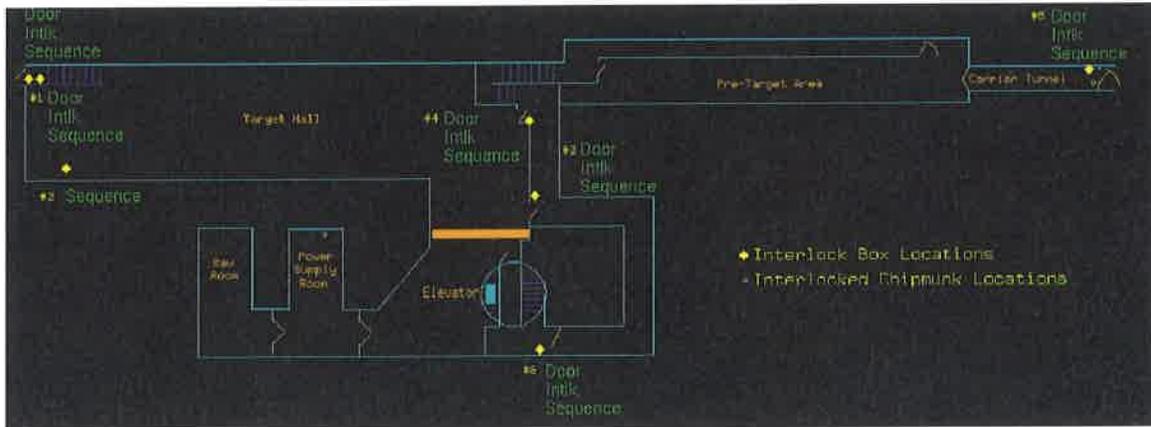
Other

Operating Note

NuMI

Low Intensity Target & Horn Scans

November 4, 2019



The current Running Condition for NuMI HEP operation is modified as follows:

Low intensity scans will be conducted to verify horn and/or target positions. Beam Permit System inputs can be bypassed as needed for these scans. The intensity must be temporarily reduced to low intensity (no more than 1.2 E12 protons/pulse, no faster than 10 seconds between pulses) at 120GeV. Intensity limit is as follows:

4.32 E14 protons/hr

1.2 E12 protons per pulse, 360 pulses per hour

Special Concerns: The purpose of this Operating Note is to conduct low intensity horn and target scans in order to adjust and verify component positions. All required chase shielding is in place except the T Blocks.

The Target and module will remain in the work cell during Horn scans. During the Horn or Target scans, the Target Hall shield wall and air barrier is not in place at the roll up door. The underground support area will have been searched and swept. The area RSO will have a special core (PAD 621) on the elevator gate and leave the PAD 621 key under the control of the MCR Crew Chief. Area RSO or designee authorization is required to use this key and access the underground during Horn or Target scans.

To access the underground support area during Horn or Target scans: 1. Obtain area RSO or designee authorization. 2. Remove one MI-65 interlock key and lock it up in the LOTO group lockbox. (Note: Do NOT issue any MI-65 interlock keys to any entrants). 3. Entrants must apply their LOTO locks to the LOTO group lockbox. 4. Crew Chief or his or her designee must accompany the entrants to MI-65 upstairs elevator gate to unlock the gate and let the entrants enter and stay there until the entrants return and exit. 5. Return to the MCR and restore the MI-65 interlock key to the key tree.

Target chase R-Blocks are in place; however, they are not sealed against air leaks. T Blocks are not in chase, they are stored in the T Block storage area. It is acceptable to run beam at low intensity as stated above during the time when the R-blocks are not sealed, T Blocks are not in chase and the Target Hall shield wall is not in place. The area RSO or designee is responsible for confirming the status of these items before target scans.

This Operating Note is in effect from November 4th, 2019 until it is rescinded by the area RSO. NuMI HEP operations may NOT resume until approved by the area RSO.

N. Chelidze

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other
